

# Product and Quotient Rule

10/16

ES: What is the product and quotient rule? How do we apply the rules?

Find  $y'$  ex

$$y = (3x+5)(x^2)$$

$$y = 3x^3 + 5x^2 \Rightarrow y' = 9x^2 + 10x$$

Product Rule

$$\frac{d}{dx} [f(x) \cdot g(x)] = f(x) \cdot g'(x) + f'(x) \cdot g(x)$$

OR

$$\frac{d}{dx} [u \cdot v] = u \cdot v' + u' \cdot v$$

Find  $y'$  ex

$$y = (3x+5)(x^2)$$

$u$                    $v$

$$y' = (3x+5)(2x) + (3)(x^2)$$

$u \cdot v'$                    $u' \cdot v$

$$= 6x^2 + 10x + 3x^2$$

$$y' = 9x^2 + 10x$$

Find  $y'$  ex

$$y = \frac{3x+5}{x^2}$$

$$y = (3x+5)x^{-2}$$

$$y = 3x^1 x^{-2} + 5x^{-2}$$

$$y = 3x^{-1} + 5x^{-2}$$

$$y' = -3x^{-2} + (-10)x^{-3}$$

$$y' = -\frac{3}{x^2} - \frac{10}{x^3}$$

Quotient  
Rule

$$\frac{d}{dx} \left[ \frac{f(x)}{g(x)} \right] = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{[g(x)]^2}$$

OR

$$\frac{d}{dx} \left[ \frac{u}{v} \right] = \frac{u' \cdot v - u \cdot v'}{v^2}$$

ex

Find  $y'$

$$y = \frac{3x+5}{x^2} \cdot \frac{u}{v}$$

$$y' = \frac{(3)(x^2) - (3x+5)(2x)}{(x^2)^2}$$

$$= \frac{3x^2 - (6x^2 + 10x)}{x^4}$$

$$y' = \frac{-3x^2 - 10x}{x^4}$$

Summary

Homework #6B pg 125 #1-12 all,  
13, 15, 17, 18, 25-35 odd, 64 and 66.  
Due 10/18. Thursday